

HOUSING ARTHROPODS AND OTHER INVERTEBRATES STORED IN ALCOHOL¹

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ABSTRACT: Storage of arthropods and other invertebrates in alcohol is discussed. A system that employs glass culture tubes with polyethylene plugs housed in wide-mouth glass canning jars with polyethylene lids is described. The system is easy to use, inexpensive, and appears to be excellent for long-term storage of specimens in alcohol.

Storage of arthropod and other invertebrate specimens preserved in alcohol has long been a problem and has been accomplished by many different methods (Beirne 1955; Borror *et al.* 1981; Freeman 1974; Gregg 1968; Knudsen 1966; Levi 1966; and Peterson 1959). Gregg (1968) discussed the subject in detail. Major problems are rusting and corrosion of jar lids, shell vial contents becoming mixed or lost in the storage jar, small arthropods becoming entangled in cotton plugs, vials drying out, stoppers drying out or even swelling, and difficulty in easily locating and retrieving specific vials.

A storage system has been developed and is being used at the Orma J. Smith Museum of Natural History, College of Idaho (CIDA), Caldwell, which overcomes these problems and is relatively inexpensive.

MATERIALS AND METHODS

Storage Jars

The materials required for this storage system are shown in Table 1. Ball™ wide mouth, tapered, pint canning jars were selected since they allow direct removal of any vial in the jar. This jar is also slightly taller than most other jars of its type and thus allows use of longer vials (up to 10 cm + stopper) if needed. Each jar holds 24 (12 mm I.D.) vials and has room for fluid to be added to retard evaporation. Canning jars cost roughly 20-30 percent as much as standard jars sold for museum uses. Because the metal lids that come with canning jars usually rust or corrode in a very short time, tend to seal in time and are thus difficult to open, we replaced them with a low density polyethylene lid. The polyethylene lid material is available from plastic vendors in 4' x 8' sheets (1/16" thick). It is a flexible, non-

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brittle form of plastic which forms an airtight seal when secured to the jar with the metal ring which is supplied with the jars. We encountered problems finding someone to cut the round lids at a cost effective rate and cut the lids ourselves using a 3 1/4" arch punch (Osborne #149, C.S. Osborne & Co., Warren St., Harrison, NJ 07029) purchased as a one time investment of about \$90.

Vials

The individual vial system consists of 12 mm (I.D.) non-sterile glass culture tubes and polyethylene plug stoppers. The culture tubes (Fisher Scientific Company, 711 Forbes Avenue, Pittsburgh, PA 15219, is one of many suppliers) are very inexpensive (\$0.015) in comparison with normal specimen vials and bottles. Sometimes they can be recycled from other uses further reducing expense. Several racks are available for supporting the tubes while they are being used. It was found that the 80 tube capacity Bel-Art Products® polypropylene rack (#H18910) (cost \$6) works best. Stoppers are available from several sources in clear polyethylene. However, if desired, colored stoppers can be used to segregate collections by region, taxon, or other category. Colored stoppers are available from Elkay® Products Inc. The stoppers and vials can be retrieved easily from the storage jar with a pair of forceps eliminating any need to empty the entire jar, reducing inconvenience, alcohol spillage and mess.

Seventy percent isopropyl and ethyl alcohol were used with good results. Arthropods used in the trial usage of the system were prepared in a variety of ways: collected directly into alcohol (70 percent isopropyl or ethanol); fixed in KAAD or boiled and placed into alcohol; or collected in ethylene glycol (antifreeze) pitfall traps and later transferred to alcohol.

RESULTS AND DISCUSSION

Storage Jars

The storage system is working well in the Museum. One of us (REG) has stored his ant collection in regular-sized canning jars with the polyethylene lids since 1970 with good results. Individual polyethylene plug stoppers have been in use since 1979 (by WHC) with no obvious effects from contact with alcohol.

The tapered jar allows for 3" tall dividers constructed of 1/4" masonite or plywood. These dividers form rows on shelves, cabinets, or in drawers and do not need to be fastened down to be effective.

The system consists of easily obtained materials and is very inexpensive. The jar and lid cost a total of \$0.50 (1986 prices) (Table 1).

A disadvantage of the canning jar used is that it has raised design and letters which might make the application of large labels difficult. Labels indicating the contents of the jars could be placed inside between the vials and the jar surface.

Vials

We have had the colored vial stoppers submerged in alcohol for 4 years with no evident color changes and no subsequent coloring of the alcohol or labels in the vials.

The vial and stopper cost \$0.04 (1986 prices) (Table 1). Our total system costs approximately \$1.46 for storage jar and 24 tubes complete (January 1986 prices) compared with a cost of approximately \$3.50 for similar storage capacity.

Conversion to this system would not involve a change in a museum's normal protocol for type of alcohol used, type of labels used in the vials and type of jar labeling. The vials require no additional preparation for shipment and can be packaged by normal means (Shepard 1985).

Disadvantages of the system are few. The tubes used have a round rather than flat base so they are not free standing. Yet even this may be beneficial as it eliminates any possibility to leave vials standing and thus leading to spillage. If this is a major problem one can still use standard vials

TABLE 1. Materials required for storage system of invertebrates in alcohol. Prices current as of January 1986 and may vary with source.

DESCRIPTION	UNIT PRICE
Storage container	
Ball™ wide mouth tapered pint canning jars ¹	\$0.43
Polyethylene lids ²	.07
Cost per storage container	\$0.50
Individual tubes (vial)	
Borosilicate glass disposable culture tubes, 12 mm (I.D.), various lengths ³	.025
Polyethylene plug stoppers ⁴	.015
Cost per individual vial	\$0.04
TOTAL COST PER JAR W/24 TUBES	\$1.46

¹ Available from many local grocers.

² Cut from 4 x 8' x 1/16" low density polyethylene (ca. 380/sheet).

³ Available from most scientific supply outlets. Cost based on No. 14-962-10B (12x75mm) from Fisher Scientific Products®, 711 Forbes Avenue, Pittsburgh, PA 15219.

⁴ Available as Catalog No. 127-0019-100 (for clear stoppers); -101 (red); -102 (blue); -103 (green); -104 (yellow); and -105 (orange) from Elkay® Products, Inc., P.O. Box 5247, Turnpike Station, 800 Boston Turnpike, Shrewsbury, MA 01545.

with flat bases with this storage jar system. One obvious disadvantage is that the diameter of the tube limits the size of arthropod that can be stored inside; however, this is true of any storage system.

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Paul Maslin, curator of Herpetological Collections, University of Colorado Museum, Boulder (now deceased) gave the initial idea for the plastic covers in the storage jar system. Paul E. Blom and David M. Ward, Jr., have assisted in the development and trial of the system. Paul Blom and Eric Yensen reviewed and offered valuable comments on the paper.

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BOOK RECEIVED AND BRIEFLY NOTED

ECONOMIC IMPACT AND CONTRACT OF SOCIAL INSECTS.
S.B. Vinson, ed. 1986. Praeger Pub. 421 pp. \$49.95.

Fourteen chapters written by seventeen contributors concerning the problems that social insects cause to man, his structures, food and artifacts. Also included are chapters on biology, physiology, and ecology of several selected social insects. Current control technologies are discussed.